Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims

Claim 1 (currently amended): A tunnel diode comprising

a) an emitter electrode, wherein said emitter electrode comprises a metal;

b) a collector electrode, separated from said emitter electrode by a gap, said collector electrode ~~consisting of~~ comprising a band gap material, said band gap material being a crystal material having filled zero temperature valence band and empty conductive band; wherein said gap contains only a vacuum or an inert gas under low pressure and wherein a work function of said collector electrode is less than or equal to a work function of said emitter electrode.

Claim 2 (canceled)

Claim 3 (currently amended): The tunnel diode of claim 1 in which the collector electrode comprises a metal having a layer of band gap material deposited thereupon.

Claim 4 (previously presented): The tunnel diode of claim 3 in which said layer of band gap material has a thickness greater than the mean distance of relaxation of electrons tunneling from said emitter.

Claim 5 (previously presented): The tunnel diode of claim 1 in which the band gap material is selected from the group consisting of: a semiconductor, a hetero-structured semiconductor, a dielectric, a diamond material, an alkali metal oxide and an alkaline earth oxide.

Claims 6 (previously presented): The tunnel diode of any claim 1 in which the band gap material is selected from the group consisting of: Ge, Si, GaAs, SiC and AlGaAs.

Claim 7 (previously presented): The tunnel diode of claim 1 in which said gap is in the range 1 – 100nm.

Claim 8 (previously presented): The tunnel diode of claim 1 in which said gap is in the range 1 – 10nm.

Claim 9 (canceled).

Claim 10 (previously presented): A vacuum diode heat pump comprising the tunnel diode of claim 1.

Claim 11 (previously presented): A heat to electricity converter comprising the tunnel diode of claim 1.

Claim 12 (currently amended): A method for promoting tunneling of electrons having an energy level higher than the Fermi level of an emitter electrode from an emitter electrode surface wherein said emitter electrode comprises a metal, comprising the step of positioning a collector electrode ~~consisting of~~ comprising a band gap material at a distance within [[the]] a tunneling range of said electrons, said band gap material being a crystal material having filled zero temperature valence band and empty conductive band, wherein said emitter electrode is separated from said collector electrode by a gap, said gap containing only a vacuum or an inert gas under low pressure and wherein a work function of said collector electrode is less than or equal to a work function of said emitter electrode.

Claim 13 (currently amended): A method for suppressing back tunneling of electrons in a tunnel diode comprising the step of coating a collector electrode with a layer of a band gap material, said band gap material being a crystal material having filled zero temperature valence band and empty conductive band, and said collector electrode being separated from an emitter electrode by a gap, said emitter electrode comprising a metal and said gap containing only a vacuum or an inert gas under low pressure wherein a work function of said collector electrode is less than or equal to a work function of said emitter electrode .

Claim 14 (currently amended): The method of claim 12 in which the collector electrode comprises a layer of band gap material deposited on a metal collector.

Claim 15 (currently amended): The method of claim 14 in which said layer of band gap material has a thickness greater than the mean distance of relaxation of electrons tunneling from said emitter electrode.

Claim 16 (previously presented): The method of claim 12 in which the band gap material is selected from the group consisting of: a semiconductor, a hetero-structured semiconductor, a dielectric, a diamond material, an alkali metal oxide and an alkaline earth oxide.

Claim 17 (previously presented): The method of claim 12 which the band gap material is selected from the group consisting of: Ge, Si, GaAs, SiC and AlGaAs.

Claim 18 (currently amended): The method of claim 12 in which ~~said collector and said emitter are separated by a~~ said gap is in the range 1 – 100nm.

Claim 19 (currently amended): The method of claim 12 in which ~~said collector and said emitter are separated by a~~ said gap is in the range 1 – 10nm.

Claim 20 (canceled).

Claim 21 (currently amended): The tunnel diode of claim 1 in which said emitter electrode has a layer of band gap material deposited thereupon.